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Science H

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Mentos in Diet Coke

*Observations and Expectations:*

In this experiment, I expected that the Diet Coke would react easily to the five Mentos I would place in the bottle holding 500 ml of the solution. I thought that the pure 500 ml of Diet Coke would have a more explosive reaction than any of my other solutions. In a previous experimenting involving the voltage of a “battery” – two sheets of metals wired together – and Coke, I learned that the acid in a bottle of coke happened to be conductive. When I first started this experiment, I wondered if the acidic molecules in the Coke (or Diet Coke) could possible cause the popular reaction when added with other molecules in Mentos. Therefore, I thought the more acidic the Coke was, the bigger the reaction I would get when adding Mentos to the solution. I then hypothesized that adding Mentos to 500 ml of pure Diet Coke would be more explosive then adding Mentos to solutions of water and Diet Coke, each totaling in 500 ml.

Before starting this experiment, I researched the materials and procedure normally used for obtaining the reaction of putting Mentos in Coke. Of course, I had to add a few materials and steps in the procedure so that I could test the concentration of Coke in my solution. From these websites, I also found that using Diet Coke would be easier to clean and more reactant than regular Coke, so I first chose to use Diet Coke in my experiment.

When I had gathered all of my materials, I decided to make 5 solutions:

1. 500 ml Diet Coke
2. 400 ml Diet Coke with 100 ml water
3. 300 ml Diet Coke with 200 ml water
4. 200 ml Diet Coke with 300 ml water
5. 600 ml Diet Coke (unopened or touched) – For this trial, I would put the Mentos in the bottle, and put a lid, pierced with one small hole, back on. This experiment would not test the effects of concentration of Diet Coke but would just solve another curiosity: the effect of pressure.

The first four solutions would test the effect of concentration of acid (or Diet Coke) when mixed with Mentos. (As I explained earlier, I expected the most reactant solution to be from greatest to least according to the list above.) However, when making these solutions, I observed something that I know changed my experiments’ results drastically. To make the mixtures of Diet Coke and water, I had to open the bottle of Coke, therefore releasing the pressure and carbon dioxide. I knew the carbon dioxide was somehow important to my experiment so I did try to make the solutions as fast as possible. The only bottle which I did not have to open was #5 and this would help me make some of my conclusions in the end.

Despite my research done before, the experiments were failures as I was not able to create any reaction when adding the Mentos to my solutions, even the first which I thought would surely create an “explosion” as it was pure Diet Coke. I even added activated charcoal, in search of some eruption, but obtained nothing out of the ordinary, minor bubbling caused by opening the bottle. I believed that this reason was caused by my own procedure. When releasing the carbon dioxide to make my solutions, I had probably lessened the possibility of a reaction, which would then prove my hypothesis incorrect. If the carbon dioxide was the main factor in the Mentos/Coke reaction, then it would not be, as I had thought, the acid in the Coke itself. To prove this new hypothesis, I used the unopened bottle of 600 ml of Diet Coke with five pieces of Mentos and about 20 ml of activated charcoal. This time, I did get an eruption though it only consisted of a brief fizzing over the top of the bottle.

My impromptu test led me to broaden my level of curiosity so that I now only tried to get a reaction. As another group from a different class was experimenting with Coke and Mentos, I asked them of their success from their experiments. As they had had more reactions than me, I looked for differences from our experiments. The most significant of which, I decided, was our materials. The other group first thought that regular Coke would be more effective and also believed that the Mentos and Coke from China, which I used, were probably made differently than those from the United States which would definitely affect my experiment. So with these qualifications, I tried my experiment using regular Coke, unopened and without water, and mint Mentos, like before. With these two new materials, I had three trials, each with the same results. All three of the reactions were closer to what I had expected in the beginning though still not as explosive. It was still more of a foaming over the top of the bottle but more than my first experiment with an *unopened* bottle of *Diet* Coke. I had at last achieved my goal of getting an ideal reaction out of the Mentos and Coke experiment.

*Conclusion and Qualifications:*

All of my experiments, especially the first five with the Diet Coke, lead me to believe that the acid in Coke has little effect to the reactions caused when you add Mentos to Coke (either diet or regular.) However, I did realize that the reaction is involves carbon dioxide in higher amounts, usually when just releasing the pressure of the bottle for the first time. After my first few, failed experiments, I did a bit more research to look more into the popular Mentos and Coke experiment, to see if I was heading in the right direction. An article from New Scientist, *Science of Mentos-Diet Coke Explosions* *Explained* by Hazel Muir, showed that the roughness of a Mentos actually increased the bubbles in Diet (or regular) Coke as it caused a disruption between the water molecules. When you pour a glass of Coke, the carbon dioxide escapes through little bubble formed through rough or uneven spots in the glass. When a Mentos is added, there is more rough surface area and therefore more bubbles can be created more rapidly, causing the eruption. Knowing this, I would redo my experiments but instead of testing on the acidic concentration, I would test the effect of the roughness of a Mentos candy. I would sandpaper or chip away at the Mentos candy in order to create different types of surfaces.

The series of experiments has improved my understanding of atoms, especially those of water, as a whole. The water molecule is an entirely distinct concept of its own. Since Coke (regular or diet) is mostly made of water and consists of carbon dioxide, it can easily react to other molecules, like those of a piece of Mentos, which separate it from other water molecules. Because the oxygen-hydrogen bond polarities do not cancel, water molecules are polar. This means that water molecules are greatly attracted to other water molecules. The Mentos acts as a separation between the water molecules and like explained before; bubbles are formed, causing the reaction. Before this experiment, I did not fully understand the idea of polarity and the effect or strength of attracted molecules. I never knew that a separation between their attractions could cause such an eruption.

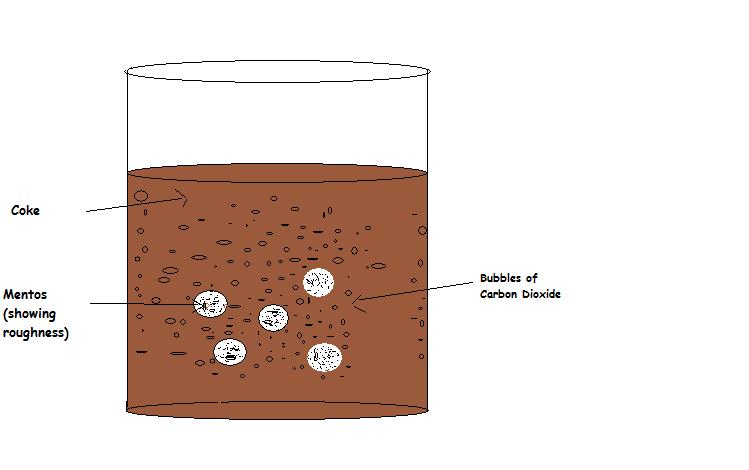


Figure shows the beginning of a Coke and Mentos eruption. You can see the carbon dioxide bubbles forming from the sides of the glass (like normal) and bubbles forming from the roughness of the Mentos.